

Abstract

5 An apparatus for preparing a RF radar transmit waveform and for decoding RF return waveforms comprising: a RF-lightwave encoder and a decoding preprocessor to phase-encode the RF radar transmit waveform and partially decode the return signal, the encoder including switched optical delay lines for producing desired RF phase shifts, and the decoding preprocessor including a tapped optical delay line and optical delay lines that counteract the delays imposed by the delay lines of the encoder, wherein the RF-lightwave encoder and the decoders allow shorter
10 compressed pulses and larger pulse-compression ratios to be achieved than can be obtained using conventional electronic approaches. Wideband transmit waveforms can be generated due to the use of the switched optical delay lines and, unlike prior art approaches, is not restricted to single-frequency waveforms. The taps can be weighted to accomplish objectives such as reduction of side lobes in the compressed pulse.